**Markivnokov’s Rule**

#### 1) For the following reaction:

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#### Describe the product as major or minor and Explain your answer.

#### 2) (i) Draw the structural formulae of the two organic molecules C and D, formed in the reaction of but-1-ene with steam. Molecule C undergoes a further reaction with PCl3 or PCl5 or SOCl2 to form 2-chlorobutane.

**(ii)** Elaborate on the reaction occurring

In your answer you should include:

• identification of the major and minor products

• an explanation of why there are two possible products

• justification of your placement of the different structures in boxes C and D with reference to the reaction sequence.

**3)** Compare and contrast the reaction of HCl with but-1-ene, CH2 = CH – CH2 – CH3, and but-2-ene, CH3 – CH = CH – CH3.

Your answer must include:

• an explanation of the type of reaction occurring

• equations showing the structural formulae of all reactants and products

• a justification of why major and minor products form with one of these molecules, but not the other.

**4)** Discuss the reaction of HCl and Cl2 with but-1-ene, CH3– CH2– CH = CH2.

For each reaction you must include:

• an explanation of the type of reaction occurring   
• structural formulae of all organic product(s) formed, including major and minor products, if any.

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